

however, occurred with a sky apparently pure, or with a very light veil, these globules can not be densely packed, as otherwise they would form a visible mist. This thin distribution explains how, in some cases, the light suffers so little absorption that brilliant rings could be seen around the moon *before sunset* (observation 38). On the other hand, the best displays have been observed to be characterized by a fairly sharp edge to the main ring at least (observations 5, 30, 38, 70, 95), with the exception of the annulus of 99, and diffraction patterns are known to be sharpest when the screening particles are of very uniform size. This condition seems to be difficult of realization in agglomerations of large vesicles of water vapor, while quite possible with very small vesicles. Such homogeneity of size would, moreover, produce several colored rings, while only one could be seen generally. In some cases, two or three rings were observed, but they usually did not extend farther than $1\frac{1}{2}$ to $1\frac{3}{4}$ diameters from the limb of the moon (observations 5, 31, 38, 70, 99, 103). The majority of the annuli observed extended only to about $\frac{1}{2}^\circ$ from the limb, while the coronas are situated at a minimum distance from the limb of $1\frac{1}{2}^\circ$ to 2° . A very few intermediate sizes were observed (observations 71, 103).

THE DUTY OF THE GOVERNMENT TO PROTECT THE PEOPLE FROM SWINDLERS.

Under existing laws of the United States it is not allowable to use the United States mails to promote lotteries or any form of swindling. The public authorities do not wait for the victim to bring suit but do so themselves promptly in the name of the people.

It is the duty of the Editor to call attention to the fact that the folly of any human attempt to make rain or to alter the weather in any way, has been so abundantly demonstrated in this country, in Europe, in Australia, in New Zealand, and elsewhere, that it is high time our law givers made it a penal offense to promise to do this or to secure money under such false pretenses as these promises are.

It is not enough to say that the "operator" makes no promise, that he only experiments and performs and leaves it to the public to draw its own conclusion. The good natured public is willing to give the fakir a dollar and stand by looking on with idle curiosity. The local authorities want a crowd at the county fair and the rain-maker draws, just as did Barnum's wooly horse seventy years ago. Well, put him in a cage and let him draw, but stop this praying and sacrificing, dynamiting, and steaming. Let the deluded ones go elsewhere to spend their money.—C. A.

THE OBSERVATORY ON MOUNT ETNA.

Under the above title in the MONTHLY WEATHER REVIEW for April, 1908, p. 102, we erroneously referred to Prof. G. B. Rizzo, as director of the observatory near the summit of Mount Etna, whereas it is really Prof. Annibale Riccò who is director of the summit observatory and is also director of the astronomical observatory at Catania, the official name of which is Regio osservatorio astronomico ed Etneo.

On the other hand Professor Rizzo, who is director of the observatory of Messina and of the Institute for Terrestrial Physics and Meteorology of the Royal University, at Messina, writes that in studying solar radiation he includes observations with the Ångström electric compensating pyrheliometer both at the Roccamellone and at the summit also, by the kind cooperation of the director Professor Riccò.—C. A.

THE HEAVIEST RAINFALL IN ONE HOUR.

By Prof. A. G. MCADIE. Dated San Francisco, Cal., July 8, 1908.

In connection with the note on a cloudburst near Shasta, Cal., in the MONTHLY WEATHER REVIEW for April, 1908, p. 97, and the article on cloudbursts, by Mr. Edward L. Wells, Sec-

tion Director, Boise, Idaho, in the Year Book for 1906, p. 325, it seems proper to call attention to a well authenticated case of a cloudburst which appears to have been overlooked. At Campo, Cal., August 12, 1891, a rainfall of 292 millimeters in one hour occurred, or at the rate of 4.87 millimeters per minute. This is probably the heaviest rainfall [in one hour] on record. At least it heads the column of heaviest rainfall given by Hann in his *Lehrbuch der Meteorologie*, 2d edition, p. 272.

The details of this cloudburst, and the rainfall measurements, by Mr. Archibald Campbell, of Campo, were sent to the Central Office in a communication previous to the 18th of April, 1906. Unfortunately all of our records have been destroyed. The rate of precipitation is more than twice that given by Mr. Wells, in the Year Book for 1906, in the article on cloudbursts, as occurring at St. Louis, on August 15, 1848. At Campo 11.50 inches (292.1 millimeters) fell in twenty-four hours. This is both the greatest rainfall in twenty-four hours and in one hour.

From the MONTHLY WEATHER REVIEW for August, 1891, we find that this was the heaviest monthly, daily, and hourly rainfall reported during the month of August up to 1891.

Original notes made by S. E. Gaskill, cooperative observer at Campo, Cal., regarding the cloudburst of August 12, 1891.

On the 12th of August had a cloudburst. One heavy thunder-cloud came up and it rained about thirty minutes very hard, raising the water in the streams flood high by the gage. I could not tell [how much water had fallen because] it was running over, emptied it and then another cloud came up and the one that had past over drew back and the two came together and it poured down whole water nearly. I went to the gage again in thirty minutes and it was running over and the reservoir was nearly half full, I emptied it out of the gage and did not stop to measure the reservoir; after the shower was over I went out to measure the water and the gage was gone, carried off by the flood. It was exciting times with us about that time.

The Weather Bureau is not aware of any rainfall in the United States, which has exceeded the above record for one hour at Campo, Cal.—C. A., jr.

STUDIES IN THE FORMATION OF FROST.

By DEWEY A. SEELY, Observer. Dated Peoria, Ill., May 8, 1908.

For some years past the writer has taken an active interest in temperature variations near the surface of the soil, and in the moisture and temperature conditions which accompany the formation of frost. Over two years ago, January 22, 1906, I enumerated a number of problems which I intended to work upon. They were as follows:

- (1) What becomes of the heat of condensation during the formation of dew and frost?
- (2) Are fluctuations in temperature at night due to ascending and descending currents of air?
- (3) How does the color of the soil affect the amount of frost formed?
- (4) What effect does a covering of vegetation over the ground have upon its temperature and the amount of frost deposited?
- (5) What are the sources of that moisture which forms as dew and frost, and how much does each contribute?
- (6) What is the effect of smudging, flooding, cultivating, etc., upon the formation of frost?
- (7) How far does the temperature fall on clear, still nights below the dew-point as determined in the late afternoon or early evening?

I have been at work upon suitable experiments and observations during the past two years, but failed to secure many definite results on account of the complexity of the problems and the impossibility of eliminating nonrelated causes and effects. However, I desire to report what little I have accomplished.

form first near the roots of the grass, while the tops of the blades were still dry, indicating that part of the moisture, at least, came from the ground. Water in the soil, warmed by the sun's rays, continued to evaporate during the evening, but was condensed again upon coming in contact with the cooler grass blades. The next portion of the grass blade to bear dew was the tip end. Here the dewdrop forms before the middle of the blade becomes moistened. Probably this moisture comes almost entirely from the air. Undoubtedly one source of dew-forming moisture is the water exuded from the stomata of the plant. But perspiration by the plant ceases about as soon as the air becomes saturated, therefore the amount from this source can not be great. Just how much each source contributes is impossible to estimate.

Little work was done to determine the effects of smudging, flooding, and cultivating the ground upon frost formation. A small area of ground was dug up and raked over, and a thermometer, with bulb encased in a growing onion leaf was exposed over it. Another instrument, similarly mounted, was exposed over soil which had not been cultivated for some time. On several mornings both thermometers were read, and in every case the former instrument registered about 2° higher than the latter. These observations suggest the advisability of thoroly cultivating the soil as a measure tending to protect against the destructive effects of frost. A thorow wetting of the soil seemed to have but little influence on the temperature of the vegetation growing upon it.

In order to determine how far the temperature falls on clear, still nights, below the dew-point recorded late in the afternoon before, the records of the Peoria station were gone over for one year, and the data selected which could be used to investigate this point. The dew-point, as recorded at 7 p. m.,¹ and the minimum temperature registered the following morning on 60 nights, were tabulated and the differences computed. From these it was found that on the average the minimum temperature went 2.9° below the 7 p. m. dew-point. In but three cases did the temperature fall more than 10° below the dew-point recorded at 7 p. m.

By examining thermograph traces made during clear weather with light winds, it will be observed that the temperature decline goes on much more rapidly during the first part of the night before the dew-point is reached. After it has fallen to that point the decline is much less rapid, and in some cases the fall is entirely checked, or changed to a rise. These all point to the same conclusion, that a portion of the heat of condensation in the formation of dew and frost is retained by the lower air.

RECENT ADDITIONS TO THE WEATHER BUREAU LIBRARY.

C. FITZHUGH TALMAN, Librarian.

The following have been selected from among the titles of books recently received, as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies. Most of them can be lent for a limited time to officials and employees who make application for them. Anonymous publications are indicated by a —.

Aachen. Meteorologisches Observatorium.

Deutsches meteorologisches Jahrbuch... 1906. Aachen. Jahrgang 12. Karlsruhe. 1908. 56 p. f°.

Agra and Oudh. Meteorologist.

Administration report 1907-8. Allahabad. 1908. 4 p. f°.
Brief sketch of meteorology... 1907. Allahabad. 1908. 7 p. f°.

Australia. Commonwealth meteorologist.

A new form of pressure anemometer. By H. A. Hunt. Melbourne. [1908.] 10 p. 8°.

Rainfall map of the commonwealth of Australia. Bull. no. 2... by H. A. Hunt. Melbourne. 1908. 11 p. 8°. 1 map. 56 x 61 cm.

Bargmann, A.

Himmelskunde und Klimakunde. Lehrplan, Beobachtungen und Lektionen. Leipzig. 1908, viii, 215 p. 8°.

Behre, Otto.

Das Klima von Berlin. Berlin. 1908. 158 p. 8°.

Bendel, Johann.

Wetterpropheten... Regensburg. 1904. 166 p. 8°.

Carnegie institution.

Handbook of learned societies and institutions. America. Washington. 1908. 522 p. 8°.

Crelle, A. L.

Rechentafeln... Neue Ausgabe. Berlin. 1907. n. p. f°.

Dewar, Daniel.

Atmospheric movements 1908-9. Glasgow. 1908. 3 p. 16°.

Drygalski, Erich von.

Allgemeiner Bericht über den Verlauf der Deutschen Südpolar-Expedition. Mit Vorbemerkungen von Ferdinand Freiherr v. Richthofen und einem Anhang, Bericht über die Arbeiten der Kerguelen-Station, von Karl Luyken. Berlin. 1903. viii, 73 p. 4°.

Erman, Adolph.

Reise um die Erde durch Nord-Asien und beiden Ozeane in den Jahren 1828, 1829 und 1830. Berlin. 1833-1848. 3 v. 8°.

11 Tafeln des Atlas zu Erman's Reise um die Erde. Ausgegeben mit den dritten Bande der ersten Abtheilung. Berlin. 1848. 11 sheets. 45 x 31 cm.

Verzeichniss von Thieren und Pflanzen, welche auf einer Reise um die Erde gesammelt wurden. Berlin. 1835. 64 p. 17 pl. f°.

Ficker, Heinz von.

Zur Meteorologie von West-Turkestan. Wien. 1908. 35 p. f°.

Findeisen, F.

Praktische Anleitung zur Herstellung einfacher Gebäude-Blitzableiter. Zweite Auflage. Berlin. 1907. vi, 126 p. 8°.

France. Service hydrométrique du bassin de la Seine.

Observations sur les cours d'eau et la pluie centralisées... 1906. n. p. n. d. 7 sheets. 60 x 46 cm.

Résumé des observations centralisées... 1906. n. p. n. d. 25 p. f°.

Freybe, Otto.

Klima- und Witterungskunde. Hannover. 1908. iv, 71 p. 12°.

Froc, Louis.

Les tempêtes dans la province maritime du Fou-Kien (Chine). Extrait de la Revue des questions scientifiques, octobre, 1907. 8p. 8°.

Frost, J.

Agrarverfassung und Landwirtschaft in den Niederlanden. Berlin. 1906. vii, 495 p. 4°. (Berichte über Land- und Forstwirtschaft im Auslande. Mitgeteilt vom Auswärtigen Amt. Buchausgabe Stück 12.)

Gerdien, H.

... Untersuchungen über die atmosphärischen radioaktiven Induktionen. Berlin. 1907. 75 p. 4°. (Abhandlungen der Königlichen Gesellschaft der Wissenschaften zu Göttingen, mathematisch-physikalische Klasse. Neue Folge. Band 5. Nro. 5.)

Hale, George Ellery.

The study of stellar evolution. Chicago. 1908. xi, 252 p. civ pl. 8°.

Hamburg. Deutsche Seewarte.

Deutsche überseeische meteorologische Beobachtungen. Hamburg. 1908. 129 p. f°.

Hellmann, G[ustav].

Meteorologische Volksbücher. Berlin. 1895. 68 p. 4°.

Hungary. M. kir. orsz. meteorologiai és földmégnességi intézet.

Nagtagyos 1901-7. évi meteorologiai megfigyeléseinek eredményei. Budapest. 1908. 16 p. 8°.

India. Meteorological department.

Memorandum on the meteorological conditions prevailing in the Indian monsoon region before the advance of the southwest monsoon of 1908, with an estimate of the probable distribution of the monsoon rainfall in 1908. Simla. 1908. 3 p. f°.

Kienast, Hermann.

Das Klima von Königsberg i. Pr. Teil 3. Der jährliche Gang der Lufttemperatur, dargestellt auf Grund der Beobachtungen aus den Jahren 1848-1906. Königsberg. 1907. 45 p. f°.

Marangoni, Carlo.

Fantasia sulla grandine. Firenze. 1899. 7 p. 8°. (Estratto dagli Atti della R. accademia dei Georgofili. Anno 1899. v. 22. Dispensa 2.)

Merzifun (Asia Minor). Anatolia college.

Meteorological records. 1907. 1 sheet. 24 x 36 cm. n. p. n. d.

Moncalieri. R. collegio Carlo Alberto. Osservatorio meteorologico.

Riassunto delle osservazioni meteorologiche fatte al Grand Hôtel du Mont Cervin (Giomein-Valtournanche) in Valle d'Aosta durante la stagione estiva (luglio, agosto, settembre 1906). Perugia. 1907. 15 p. 8°.

Naturforschender Verein in Brünn.

25. Bericht der meteorologischen Commission. Ergebnisse der meteorologischen Beobachtungen... 1905. 158 p. 8°. Brünn. 1908.

Verhandlungen... 1906. Brünn. 1907. 246 p. 8°.

¹ This is 7 p. m. local standard time, or ninetyeth meridian standard.